PART II: PLANNING

In Part II, Chapters 6, 7 and 8 present the Regional Performance Objectives for each of this Plan's three goals: Integrated Water Resources, Economic Development and Collaboration.

Chapter 6: Integrated Water Resources, describes the Desired State for the Region in terms of the four water resource areas: flood management, water quality, water supply and habitat. Note that the Desired State applies only to the Integrated Water Resources Goal (Goal 1) because of the need to define a common understanding of how the hydrologic ecosystem works among those who manage different aspects of this system. The Desired State is based on building a stakeholder consensus for how these hydrologic functions should be balanced given the finite quantity of water in the Region. Existing policies and regulations provide the starting point for defining the Desired State. Additionally, as described in Section 4.1, stakeholders have begun identifying other water resource objectives to provide a more robust description of the Desired State. Refinement and integration of the Regional Performance Objectives for the Desired State will take time and will occur through subsequent phases of watershed planning for the region.

Regional Performance Objectives for Goal 2, Economic Development and Goal 3, Collaboration are listed in Chapters 7 and 8, respectively. Chapter 9: Urban Design, presents a range of land-use strategies to enable the achievement of the Regional Performance Objectives.

6 • WATER RESOURCES

Goal No. 1 for the Central Orange County IRCWMP is to: "coordinate, integrate and balance the hydrologic functions of flood management, water quality, water supply, and habitat." The Desired State for our region involves implementation of a balanced approach toward managing the four primary water resource areas:

1. Flood Management
2. Water Quality
3. Water Supply
4. Habitat

In a healthy and self-sustaining environment, these four water resource areas function in balance with each other. Chapter 3 outlines some of the specific challenges and undesirable outcomes being faced in each of these management areas. For example, large scale land development has increased impermeable surface area and as a result, decreased sediment transport from land into nearby streams. This shortage of sediment supply has disrupted the natural hydrologic balance, resulting in streambed erosion and destabilization of canyon banks. This in turn has resulted in increased flooding hazard, destruction of riparian habitat and estuary sedimentation. The current movement to encourage on-site detention of storm flows is a good start toward correcting the problem.

This chapter presents preliminary watershed-wide Regional Performance Objectives for Goal 1, Integrated Water Resources. In the ongoing development of the IRCWMP, and through the adaptive management process, these objectives will be expanded and refined. Where conflict persists among these uses, local stakeholder groups and technical experts will need to collaborate to achieve a resolution. While the Regional Performance Objectives are defined for the whole watershed, they provide guidance for individual project identification, planning, design, integration and prioritization.

6.1 Flood Management Regional Performance Objectives

Storm intensity and duration, infiltration capability of the land, antecedent soil conditions (saturation of the ground due to earlier storm events) and existing water volume in the storm conveyance system impact the storm conveyance capability of a particular channel. In general, our stormwater conveyance system of natural and concrete channels is sized to handle 65 percent of the largest storm event likely to happen in a 25-year period, commonly referred to as the 25-year storm event. The other 35 percent of the peak flow is captured using a system of detention facilities

Figure 6.1 Hicks Canyon Retarding Basin sediment levels after the 2007 Santiago fire and subsequent winter rains. (3-photo sequence)

managed by the Orange County Flood Control District. With climate change, storm intensities may increase while storm durations decrease.

Regional Performance Objectives to address flood management issues that are in concert with the watershed Vision include:

1. Conduct a study by 2010 to inspect all storm and flood conveyance systems and provide findings and recommendations regarding the potential impact of climate change on flooding, canyon and channel stability, water quality and habitat.
2. Conduct a study by 2010 to provide recommendations on how to reduce peak flow in all the canyons and channels by 10 percent. The study will make recommendations on neighborhood-scale green infrastructure for water capture and treatment.
3. Conduct a study by 2012 to look for opportunities to implement stream channel naturalization efforts, including the use of eco-friendly engineering structures and soft bottomed channels, to promote riparian habitat and natural water quality treatment in concert with stable sediment transport and flood safety.

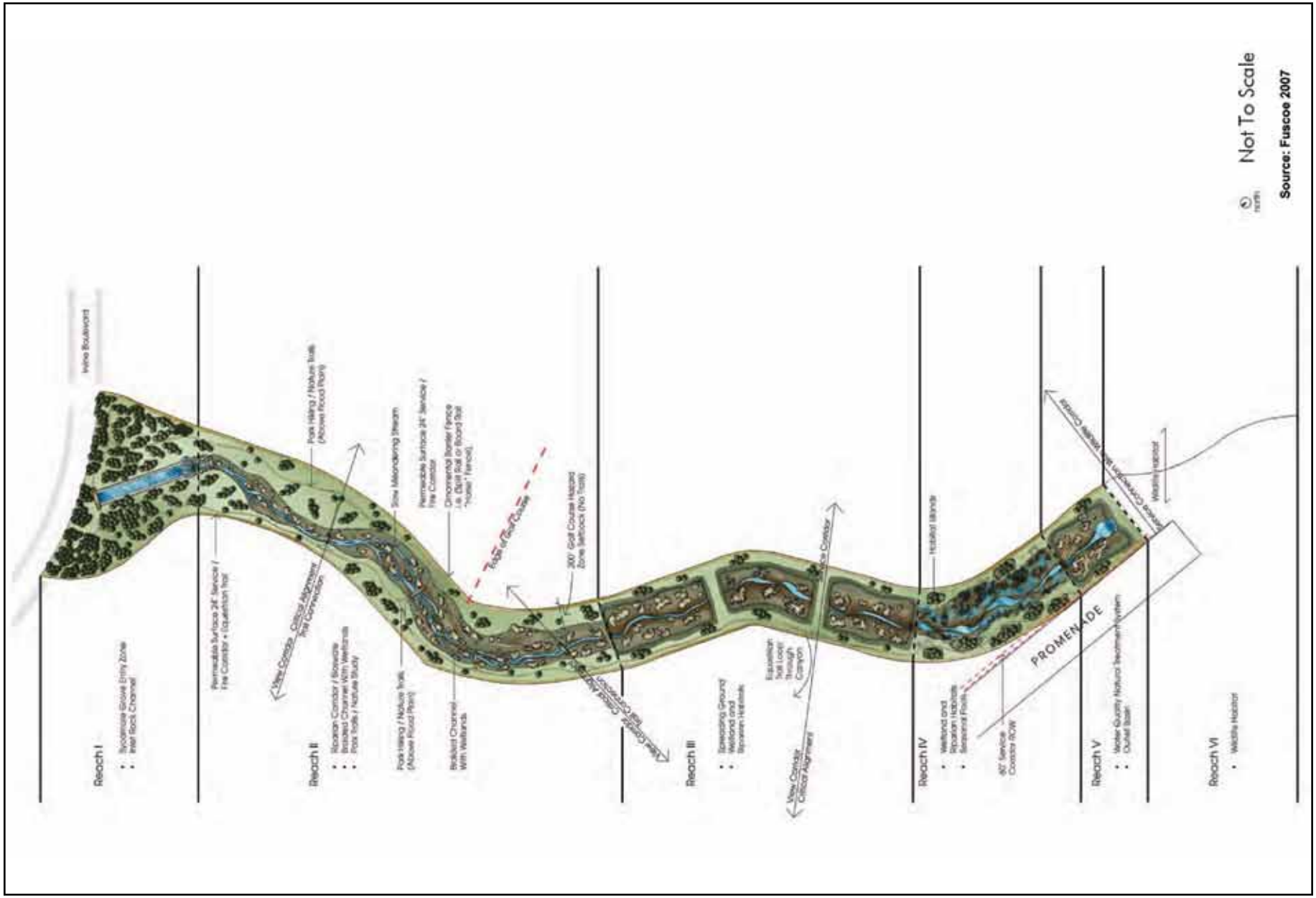

Figure 6.2 Proposed design for daylighting the Great Park section of Agua Chinon.

Figure 6.3 Borrego Channel near Alton and Barranca, Irvine

Figure 6.4 Serrano Creek restoration upstream from Bake Parkway and Toledo, Lake Forest

6.2 Water Quality Regional Performance Objectives

Water quality objectives have to do with the quality of surface water and groundwater. This section defines objectives at the site scale, community scale and regional scale.

Site Scale

The proposed Regional Performance Objectives addressing site-scale surface water runoff are:

1. By 2020, reduce the volume of stormwater urban runoff by capturing or the first 0.25 inch of rainfall on site or treating it off-site.
2. Eliminate dry weather urban runoff at site scale by 2020.

Strategies for reducing surface water runoff include:

- Requiring low impact development BMPs on all new development and redevelopment projects.
- Retaining the first 0.25 inch of rainfall on site.
- Encouraging infiltration in areas with appropriate soil, slope and groundwater levels and pollution characteristics. For example, parking lots can be graded to drain to vegetated swales. Maps locating such areas and site-scale soil testing will be necessary. Another consideration is that the Orange County Vector

Control District requires complete infiltration within 72 hours to discourage mosquito breeding. These areas should also have adequate vegetation cover to naturally treat captured water.

- In sites not suited for infiltration, consider draining runoff through vegetated swales or constructed wetlands to preserve water quality as it flows off site.
- Reducing irrigation needs by encouraging landscaping with native and non-invasive drought- tolerant plants in favor of water-thirsty or invasive (www.cal-ipc.org) plants. Local landscaping ordinances should consider requiring native or non-invasive drought-tolerant plant palettes. Encourage successful pilot projects using weather-based "smart" irrigation controllers to eliminate over-irrigation. These controllers meter water to plants based on weather conditions, plant and soil type, slope and sun exposure. Pilot studies in Southern California indicate that residential and commercial landscape reductions of 10-18 percent could be realized (U.S. Dept. of the Interior, 2008). IRWD, MWD and the U.S. Bureau of Reclamation have been leading proponents for the weather-based "smart" controllers. The State is also moving forward with regulations to promote use of these controllers.

Figure 6.5 Swale at Ladera Ranch, Orange County

Community Scale

The proposed Regional Performance Objectives addressing surface water runoff from a community are:

1. Reduce peak flows for a two-year storm event at neighborhood and subwatershed scales by 25 percent by 2024.
2. Protect from erosion all canyons and channels tributary to Newport Bay by 2020 (added August, 2009, per Bay-Coastal

Figure 6.6 Neighborhood treatment wetlands, Orange County. (Source: Fuscoe Engineering)

water quality meeting).

Strategies for reducing surface water runoff at the community scale include:

- Designing streetscapes, medians, open spaces, parks, neighborhood common areas and public facilities to capture and treat runoff from the sites themselves as well as runoff from surrounding land uses.
- Allow infiltration in areas with appropriate soil, slope and groundwater characteristics.

Regional Scale

The proposed Regional Performance Objectives addressing surface water runoff at the regional scale are:

1. Meet TMDL requirements for sediment, nutrients, fecal indicator bacteria and toxics.
2. Reduce dry weather flows to Newport Bay associated with over-irrigation and wash-down activities by 50 percent by 2020 (added August, 2009, per Bay/Coastal water quality meeting).
3. Reduce sediment loads to the bay such that no dredging of the bay is required before 2030 (added August, 2009, per Bay-Coastal water quality meeting).
4. By 2012, prepare a study to examine commercially available nutrients, herbicides and pesticides and prepare recommendations for moving toward using less toxic substances, including the practice of Integrated Pest Management..
5. By 2012, prepare a study to consider modifying stream, canyon and channel habitats to provide better removal of contaminants and to encourage aquatic nutrient cycling. Include incorporation of vegetated riparian buffers along sides of stream channels where feasible.
6. Implement and continue projects to reduce groundwater pollutant concentrations by 50 percent by 2024.
7. Reduce regional scale peak flows for a two year storm event by 25 percent by 2024.
8. Reduce regional scale peak flows for a 100 year storm event by

10 percent by 2024.

9. Reduce fecal indicator bacteria associated with pet waste discharge into Bay by 90 percent by 2024.

6.3 Water Supply Regional Performance Objectives

Ideally, the Desired State for water supply would be to supply the Region from local water sources, except in emergencies. Exactly how that could happen is not yet known. The ability to deliver water to a user is a function of the location, timing, quality, quantity and price of the source water. All of these factors have to come together correctly in order for water supply agencies to make investments in developing new sources of water and new water efficiencies. To work through these variables, agency stakeholders will need to analyze a variety of scenarios, examining the basic assumptions required in order to increase local water supplies and decrease per capita demand.

In 2009, the University of California Office of the President awarded $2.4 million to the Center for Hydrologic Modeling, which links researchers at eight UC campuses (including UC Irvine) and the Lawrence Berkeley, Lawrence Livermore and Los Alamos national laboratories. The center will determine how much water exists in California and where it's located by using satellites and field research. Water agencies throughout the state will use the results when developing policies and allocation plans. (Evangelista, 2009.)

An important first step is to quantify all of the water that is currently moving through our Region. A system water budget would quantify all of the water in the Region, where it is and where it currently goes. This analysis will show us what our constraints and opportunities are. It will be the tool the water supply agencies need in order to coordinate with flood, water quality, and habitat managers to develop management strategies for serving each of these interests.

At the same time, "Goals for percentages of water supply demand that should be met by local sources should be set collectively by all the stakeholders of the region lying within the boundary of the groundwater basin. Proposed objectives should be consistent with the existing policies and plans of the Orange County Water District." (OCWD, 2009)

This challenge may be daunting; however, it is very important. Pumping water around the state to supply distant users is the single largest user of energy in the state. Eliminating or severely reducing reliance on imported water is the most important thing this Region can do with its water resources to reduce its impact on climate

change. It is also important for ensuring an adequate water supply for habitats elsewhere in the state that depend on this water.

As agencies come together to analyze the system parameters and develop the Desired State's system design, the following Regional Performance Objectives for water supply will be refined to reflect those advancements:

1. Each local agency is to develop a water budget its service area by 2020.
2. Revise the county and municipal general plans by 2020 to integrate watershed-wise strategies into all elements of a general plan.
3. Increase total local supplies of potable and recycled water to 90 percent of total normal demand by 2024.
4. Increase total local supplies of recycled water to 90 percent of total normal demand by 2024.
5. Reduce total potable water use by 20 percent by 2024.
6. Reduce landscape irrigation by 50 percent by 2024.
7. "Over the long term (several years), the Basin must be maintained in an approximate balance (inflow and outflows are approximately equal) to ensure the long-term viability of Basin supplies." (GWMP, 2004)

6.4 Habitat Regional Performance Objectives

In general, the ecological purpose for preserving habitat is to provide the conditions the flora and fauna of the Region need for long-term and robust survival. The Ecological Society of America (Christensen, et al. 1996) lists eight elements of ecosystem management to provide guidance to the Regional Performance Objectives for Habitat:

1. **SUSTAINABILITY:** Ecosystem management does not focus primarily on deliverables but rather regards intergenerational sustainability as a precondition.
2. **GOALS:** Ecosystem management establishes measurable objectives that specify future processes and outcomes necessary for sustainability.
3. **SOUND ECOLOGICAL MODELS AND UNDERSTANDING:** Ecosystem management relies on research performed at all levels of ecological organization.
4. **COMPLEXITY AND CONNECTEDNESS:** Ecosystem management recognizes that biological diversity and structural complexity strengthen ecosystems against disturbance and supply the genetic resources necessary to adapt to long-term change.
5. **THE DYNAMIC CHARACTER OF ECOSYSTEMS:** Recognizing that change and evolution are inherent in ecosystem sustainability, ecosystem management avoids attempts to freeze ecosystems in a particular state of configuration.

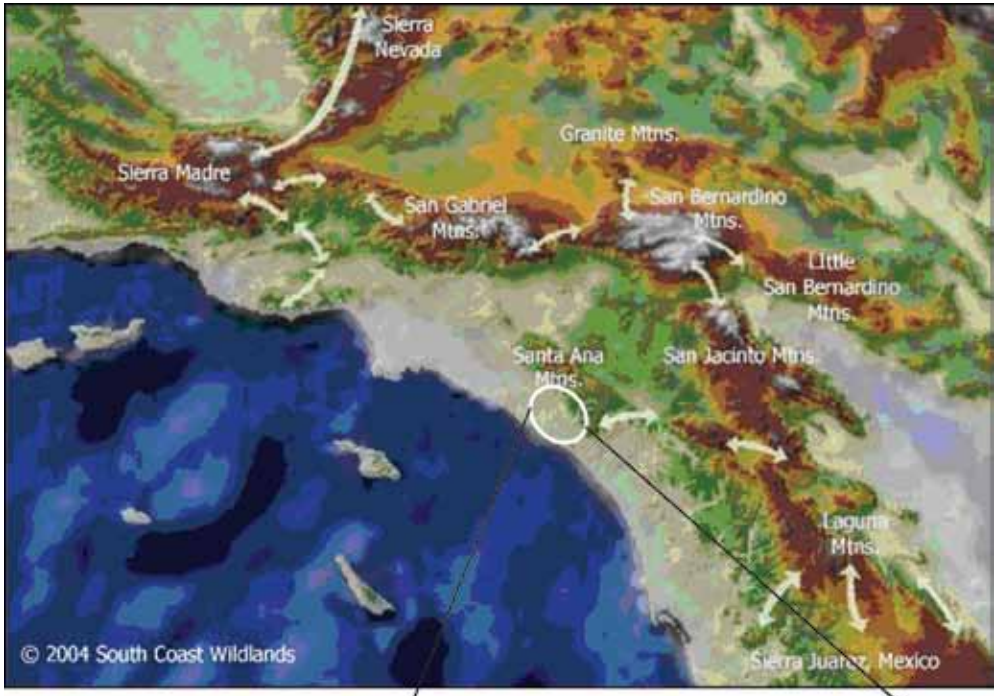

Figure 6.7 South Coast Ecoregion Wildlife Movement Linkages (Source: South Coast Wildlands Project).

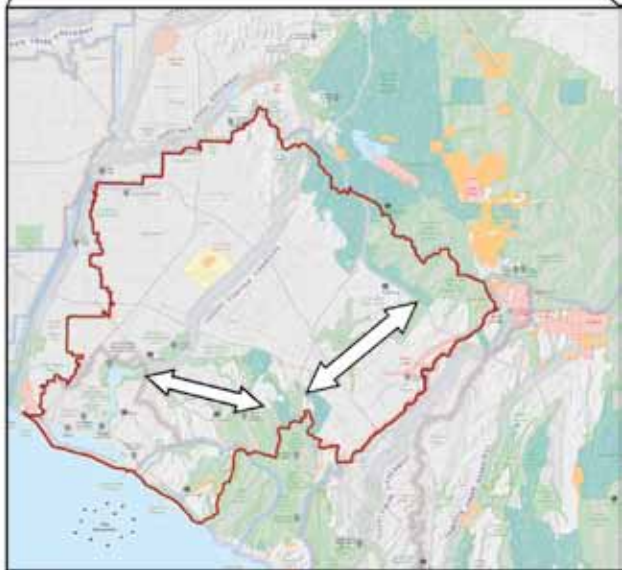

Figure 6.8 Regional and watershed wildlife linkages. Great Park Wildlife Corridor and San Joaquin Hills – Upper Newport Bay linkages. (Source: Friends of Harbors, Beaches and Parks).

6. **CONTEXT AND SCALE:** Ecosystem processes operate over a wide range of spatial and temporal scales, and their behavior at any given location is greatly affected by surrounding systems. Thus, there is no single appropriate scale or timeframe for management.
7. **HUMANS AS ECOSYSTEM COMPONENTS:** Ecosystem management values the active role of humans in achieving sustainable management goals.
8. **ADAPTABILITY AND ACCOUNTABILITY:** Ecosystem management acknowledges that current knowledge and paradigms of ecosystem functions are provisional, incomplete, and subject to change. Management approaches must be viewed as hypotheses to be tested by research and monitoring programs.

These elements reiterate the necessity of preserving ecosystem processes at multiple scales and also of allowing for population fluctuations. This is why the idea of habitat connectivity and linkage is so important. As survival becomes threatened in one area, due to natural or man-made disturbances, disease or climate change, species need opportunities to move elsewhere.

The South Coast Wildlands Project (SCWP) is a non-profit organization based in Southern California that focuses on identifying and preserving the habitat linkages that are most critical to the long term survival of those species present in the South Coast Ecoregion. They have developed habitat modeling and mapping methodologies based on the science of conservation biology. The mapping is GIS-based so that it can be easily used by a wide variety of decision makers at any scale and at any time (www.scwildlands.org).

Their work provides a methodology for identifying the most critical areas for conservation that the stakeholders here could adapt to scientifically enhance the basis of the long term Regional Habitat Performance Objectives. For ultimate effectiveness, it is important to connect the habitat management activities with the work being done at the larger South Coast Ecoregion scale. The NCCP/HCP, the Laguna Canyon Foundation and the Great Park wildlife corridor plans have already engaged in some of this type of planning (Figures 6.7, 6.8).

The U.S. Army Corps of Engineers is in the process of preparing a Special Area Management Plan (SAMP) for the riparian areas of the San Diego Creek Watershed. When finished, ecological research from that report may be useful in adjusting the Regional Performance Objectives.

The proposed habitat Regional Performance Objectives include:

1. By 2010, prepare a region-wide invasive plant review (veldt grass, garland chrysanthemum, pampas grass, artichoke thistle, castor bean, and *Arundo*) with recommendations for a systematic removal program. Study to also include recommendations for restricting sale and planting of problem plants.
2. By 2010, prepare a region-wide invasive animal review, including bullfrogs, African clawed frogs and brown-headed cowbirds with recommendations for a systematic removal

Figure 6.9 Estuarine habitat, Upper Newport Bay.

program. Study to also include recommendations for restricting sale of problem animals.

3. By 2010, prepare a study that examines evidence of impacts to the fish and birds in Newport Bay and provide recommendations for setting impact targets based on a weight-of-evidence approach.

4. By 2012, prepare a region-wide review of native plants and animals. The study to identify critical indicator species with recommended targets for population, number of breeding pairs, and spatial distribution and coverage.

Figure 6.10 Light-footed clapper rail in cordgrass. (Photo courtesy of ©Russ Kerr/majestyofbirds.com)

Of particular importance is the light-footed clapper rail (*Rallus longirostris levipes*),which has been a state and federally listed endangered species since the early 1970s. It is a non-migratory year-round resident of coastal wetlands in Southern California and northern Baja California, Mexico. It inhabits coastal salt and freshwater marshes containing cordgrass, cattails, and rushes and is often best seen during high tides, when the bird is forced out of the thick marsh vegetation. The bird rarely flies, preferring to run. It feeds primarily on invertebrates such as crabs, snails, insects, worms, and mussels, supplemented occasionally with fishes, tadpoles, plant matter and possibly mice. Raptors, raccoons and larger mammals predate on the birds and their eggs.

The survival of this bird is threatened by loss and degradation of habitat, especially nesting habitat, although management efforts may result in eventual recovery. The Upper Newport Bay subpopulation of 165 breeding pairs comprised 37.3% of the state total of 443 pairs in 2007. It is considered the only viable subpopulation of light-footed clapper rails in California that is capable of rebounding quickly following weather-induced catastrophes. The Tijuana Marsh NWR subpopulation and those of six other marshes in Southern California comprise most of the rest of the breeding populations.

5. By 2012, prepare a study of the marine life resources in the Critical Coastal Areas and Areas of Special Biological Significance and prepare recommended targets for indicator species population and diversity.
6. By 2012, prepare a region-wide review of legal and illegal trails and provide recommendations for increasing the number of legal trails and eliminating illegal trails.
7. By 2012, prepare a region-wide study of critical linkages between vegetation communities and provide recommendations for creating wildlife corridors and increasing buffer zones along creeks.
8. By 2012, prepare a region-wide study of fire hazard areas at the wildland-urban interface (WUI) and provide recommendations for establishing fuel modification zones, converting non-native grasslands to native plants, stricter building and planning regulations, improved fire response capability, restricting access to certain critical open space areas during the fire season, and reviewing fire risks due to power lines.
9. Repair and restore 75 percent of degraded wetland/upland habitat around the bay by 2020 (added August, 2009 per Bay/Coastal water quality meeting).
10. Repair and restore all degraded bay wetland and upland habitat by 2025 (added August, 2009 per Bay/Coastal water quality meeting).
11. Increase freshwater riparian habitat to 50 percent high integrity habitat by 2020.

Discussion of these objectives follows.

Estuarine

The total existing area of estuarine habitat in the Upper Newport Bay, including salt marsh, mudflat and tidal open water habitat is roughly 760 acres. The potential to expand this type of habitat is limited to areas with tidal influence in San Diego Creek, Delhi Channel, and/or Big Canyon. Rising sea levels due to climate change may impact these numbers.

Riparian and Freshwater Wetland

The total existing area of riparian habitat in the Newport Bay Watershed, per the ACOE Riparian Restoration Plan, is roughly 1,670 acres, of which 570 acres (34 percent) is considered high integrity. The IRWD Natural Treatment System Project when fully implemented would add or enhance roughly 120 acres of riparian and freshwater wetland habitats. Additionally, to minimize the adverse impacts of human activities to habitat and wildlife, vegetated buffer zones around aquatic habitat are important.

Terrestrial

Terrestrial habitats are comparatively widespread. Specific habitats (e.g., coastal sage scrub) are protected by various regulatory programs. There are roughly 354,000 acres of coastal sage scrub habitat in the watershed. Terrestrial habitats achieve greater connectivity when located in areas adjacent to riparian corridors or other habitat areas.

Another big threat to terrestrial habitat is frequent wildfires. If fires are at least 15-20 years apart, native coastal sage scrub and chaparral plant communities rejuvenate on their own. However, fires have been more frequent due to human influence. The recent October 2007 Santiago Fire burned most of the foothill areas in Central Orange County, resulting in a likelihood of type-conversion to non-native grasses, increased stress on endangered species (e.g., coastal cactus wren) and increased erosion and sedimentation. The Nature Reserve of Orange County has come up with a plan to improve fire management within larger open areas.

The Orange County Fire Authority (OCFA) provides Regional Performance Objectives for reducing fire risks in the Urban-Wildland Interface Fire Safety Report (May 2005):

- Clear all dead or flammable vegetation at least 30 feet from structures.
- Thin vegetation within the next 70 feet and replace with fire-resistant plants. See www.occnps.org and www.ocfa.org for a list of native plants that are on OCFA's fire-resistant list.
- Space trees and shrubs at least 10 feet apart.
- For trees taller than 18 feet, remove branches within 6 feet of the ground.
- On slopes or near thick, tall vegetation, clear a space at least 100 feet from all structures.
- Important design features are fire breaks, non-combustible

Figure 6.11 Riparian and freshwater wetland, Veeh Creek.

Figure 6.12 Terrestrial habitat, Laguna Coast Wilderness.

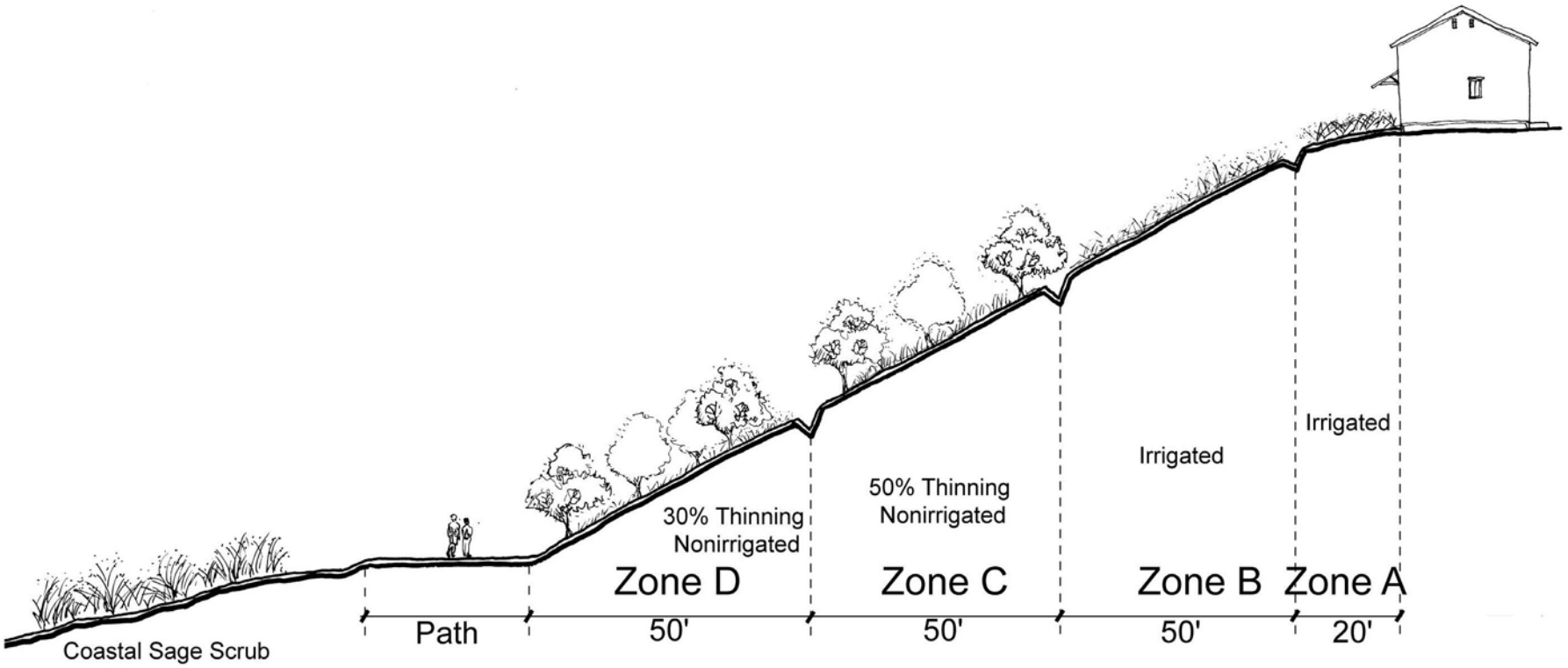

Figure 6.13 Wildland Urban Interface (WUI) fuel modification, sample section diagram. (Source: Healthy Urban Watersheds Design Guidelines, and Orange County Fire Authority)

fencing, enclosed eaves, fire-resistant roofs and decks and landscaping that reduces the risk of spreading the fire. See also: Chapter 10.1.

There may be times when the habitat needs of one of these species will conflict with the needs of another. For instance, the light-footed clapper rail and the California least tern are both endangered and breed in the Upper Newport Bay. However, one needs lower salt marsh for nesting, while the other needs sandy areas and open water close to its nesting area. The least tern now has successful breeding colonies at various locations along the coast, but the light-footed clapper rail's largest viable population is in Upper Newport Bay. Therefore, the clapper rail's habitat should be given priority in the near term while the most effective balance for the biodiversity of the ecosystem as a whole is being identified.

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